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NOTES ON GEOGRAPHIC DISTRIBUTION

Insecta, Hemiptera, Reduviidae, *Panstrongylus geniculatus*: Geographic distribution map.

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Abstract
Panstrongylus geniculatus is one of the most widely distributed species of Triatominae in South and Central America, occurring in several biomes with different climatic characteristics. We present the results of captures of *P. geniculatus* provided from a 10-year program of entomological surveillance in the state of Espírito Santo, Brazil. We also present an updated geographic distribution map of *P. geniculatus* obtained from an extensive literature review. The entomological surveillance program, between 1996 and 2005, provided 110 capture registers of *P. geniculatus* in Espírito Santo. These are the first records of *P. geniculatus* from 15 municipalities in this state. *P. geniculatus* extends through 18 countries in Central and South America, from southern Mexico to northern Argentina.

Introduction

Triatomines (Hemiptera, Reduviidae, Triatominae) are strictly hematophagous insects that are widespread in several natural and artificial ecotopes (Schofield 2000), mainly on the American continent (Galvão et al. 2003). Several species of triatomines are vectors of Chagas disease, an endemic anthropozoonotic disease that affects 15 million individuals in Latin America, with at least 90 million people at risk of infection (WHO 2002). The etiologic agent of this parasitosis is *Trypanosoma cruzi*, a flagellate protozoan that circulates in sylvatic cycles, and, more recently, in domestic cycles involving humans (Guhl et al. 2000). More than 150 wild and domestic mammals serve as reservoir hosts of *T. cruzi* (Gaunt and Miles 2000).

Panstrongylus geniculatus is one of the most widely distributed species of Triatominae in South and Central America, occurring in several biomes with different climatic characteristics (Silveira et al. 1984; Carcavallo et al. 1999). It is associated with animal burrows in humid forests, especially with armadillos, which are reservoirs of *T. cruzi* (Lent and Wygodzinsky 1979). Although it occasionally invades houses, this triatomine has not adapted to colonize human domiciles, an important factor in limiting the potential of this species as a vector of Chagas disease to man (Jaramillo et al. 2002). Colonization of pigsties near to and contiguous with human domiciles in the Amazon River floodplain, however, has been reported, with related invasions of houses and attacks on residents (Valente et al. 1998; Valente 1999).

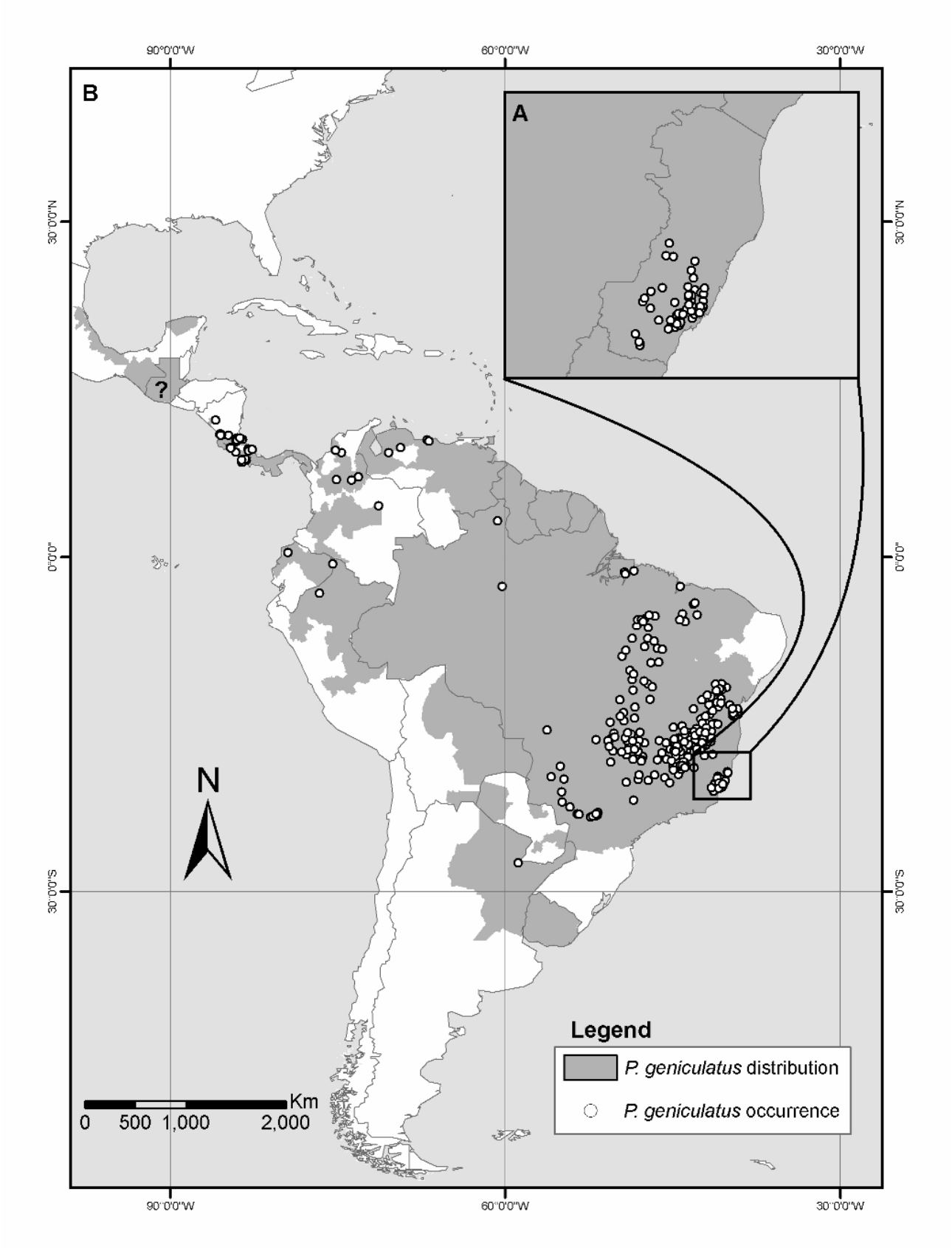
We present the results of captures of *P. geniculatus* provided from a 10-year program of entomological surveillance in the state of Espírito Santo, Brazil. We also present an updated geographic distribution map of this species obtained from an extensive literature review.

Material and methods

The study area comprises the Brazilian state of Espírito Santo, located in the southern Central Corridor of the Atlantic Forest, which has about 4.8 million ha. The annual mean temperature in the region is between 16-25 °C and the annual precipitation, between 900-2,100 mm. The elevation can reach 2,800 m in some sites (Hijmans et al. 2005). The area has a high level of species diversity, even after suffering intense devastation that reduced its original forest cover to about 5 % (Fonseca 1985).

We obtained the occurrence data of *P. geniculatus* from the database of the Fundação Nacional de Saúde of the state of Espírito Santo. This database originates from the entomological surveillance program, which is provided with records of triatomines that people have caught in their houses. We georeferenced the capture registers of *P. geniculatus* in study area between 1996 and 2005. We also created a geographic distribution map of *P. geniculatus* based on literature review.

NOTES ON GEOGRAPHIC DISTRIBUTION



NOTES ON GEOGRAPHIC DISTRIBUTION

Figure 1 (page 148). (A) Occurrence points of *Panstrongylus geniculatus* in the Brazilian state of Espírito Santo, obtained from the database of the Fundação Nacional de Saúde, between 1996 and 2005. (B) Geographic distribution map of *P. geniculatus* based on literature review. The darker gray area represents the countries, states, departments or provinces where the species is known to occur. The points represent the localities or municipalities where the species was collected (this information was not always provided by the authors in their papers).

Results and discussion

The entomological surveillance program, between 1996 and 2005, provided 110 capture registers of *P. geniculatus* from 22 municipalities in the state of Espírito Santo. We are reporting here the first records of *P. geniculatus* from 15 municipalities of this state (Appendix 1). The distribution map is in Figure 1A.

The known range of *P. geniculatus* extends from southern Mexico to northern Argentina, including several of the Caribbean islands (Carcavallo et al. 1999). The 18 countries and their major administrative subdivisions (state, department or province) where the species occurs are shown on geographic distribution map (Figure 1B) and also listed here: ARGENTINA (Chaco, Corrientes, Entre Ríos, Formosa, Misiones, Santa Fe, Santiago Del Estero); BOLIVIA (Beni, Santa Cruz, Tarija); BRAZIL (Acre, Amapá, Amazonas, Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Piauí, Rio de Janeiro, Rondônia, Roraima, São Paulo, Tocantins); COLOMBIA (Antioquia, Bolívar, Cauca, Cundinamarca, Huila, Meta, Norte de Santander, Putumayo, Santander, Sucre, Tolima, Valle del Cauca); COSTA RICA (Alajuela, Guanacaste, Heredia, Limón, Puntarenas, San José); ECUADOR (Esmeraldas, Imbabura, Manabí, Napo, Orellana, Pastaza, Pichincha, Sucumbíos); FRENCH REPUBLIC (French Guiana); GUATEMALA?; GUYANA; MEXICO (Chiapas, Veracruz, Yucatán); NICARAGUA (Managua); PANAMA; PARAGUAY (Alto Paraná, Boquerón, Caaguazú, Concepción, Paraguarí); PERU (Amazonas, Cajamarca, Junín, Loreto, Ucayali); SURINAME; TRINIDAD & TOBAGO (Trinidad); URUGUAY; VENEZUELA (Anzoátegui, Aragua, Barinas, Bolívar, Carabobo, Delta Amacuro, Distrito Capital, Falcón, Guárico, Lara, Mérida, Miranda, Monagas, Trujillo, Táchira, Yaracuy, Vargas, Zulia) (Lucena 1959; Silverie et al. 1964; Lent and Wygodzinsky 1979; D'Alessandro et al. 1984; Silveira et al. 1984; De Scorza et al. 1989; Omah-Maharaj 1989; Amunarriz et al. 1991; Bento et al. 1992; Cabello and Galindez 1998; Aguilar et al. 1999; Reyes-Lugo and Rodriguez-Acosta 2000; Zeledón et al. 2001; Crossa et al. 2002; Cuba et al. 2002; Marcilla et al. 2002; Galvão et al. 2003; Carrasco et al. 2005; Cortés and Suárez 2005; Luitgards-Moura et al. 2005; Sanchez-Martin et al. 2006).

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NOTES ON GEOGRAPHIC DISTRIBUTION

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NOTES ON GEOGRAPHIC DISTRIBUTION

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NOTES ON GEOGRAPHIC DISTRIBUTION

Appendix 1
Municipalities with records of *Panstrongylus geniculatus* in the state of Espírito Santo, Brazil.

Municipality	Latitude	Longitude	Reference
Alegre	-20.71849	-41.51256	Silveira et al.
Alfredo Chaves	-20.56306	-40.82642	This paper
Anchieta	-20.71863	-40.68430	Silveira et al.
Cariacica	-20.28931	-40.44518	Silveira et al.
Castelo	-20.55001	-41.20295	This paper
Conceição do Castelo	-20.36829	-41.26626	This paper
Domingos Martins	-20.30862	-40.84577	Silveira et al.
Guarapari	-20.58164	-40.54670	Silveira et al.
Iconha	-20.75473	-40.85736	Silveira et al.
Itaguaçu	-19.72701	-40.86461	This paper
Itarana	-19.94872	-40.88777	This paper
Jerônimo Monteiro	-20.81241	-41.39226	This paper
Laranja da Terra	-19.87469	-41.05610	This paper
Linhares	-19.38350	-40.02353	Silveira et al.
Mimoso do Sul	-21.08629	-41.37795	This paper
Muqui	-20.93605	-41.33943	This paper
Rio Novo do Sul	-20.81782	-40.91831	This paper
Santa Leopoldina	-20.12148	-40.54015	This paper
Santa Maria de Jetibá	-20.08528	-40.80452	This paper
Santa Teresa	-19.87702	-40.63280	This paper
Serra	-20.12730	-40.30131	Silveira et al.
Vargem Alta	-20.64593	-41.00307	This paper
Venda Nova do	-20.37107	-41.13904	This paper
Viana	-20.39770	-40.50686	Silveira et al.